

"Under such conditions the plants in each population that are most dissimilar in their requirements can grow where a minimum number of plants of the other population can grow." p. 85.

"Biological phenomena are never undimensional." p. 109.

"The important thing is not to make biosystematic or chemical conclusions inconsistent with the data at hand." p. 162.

". . . what constitutes a 'character' is therefore somewhat irrelevant to the problem at hand. What is important is to be sure when establishing relationships that comparable characters are considered." p. 183.

Further, there is an alarming number of spelling errors and minor errors of fact, e.g., "*annus*" for *annuus* (pp. 7 & 8), " $6^{(10^1)} = 6^{40}$ " (?) (p. 21), "subtrite for subtribe (p. 38), "Macmillan" for McMillan (pp. 41-43—the work of the publisher?), "*chrysosthoma*" for *chrysostoma* (p. 112), herbaceous *Baptisias* are said to be shrubby (p. 164), "betalins" for betalains (p. 164 and glossary). It is hoped that such errors will be corrected in future printings.

It is unfortunate that in such a small book several pages are wasted in duplicating material. An adequate page of Contents is followed by four pages of Detailed Contents. "Genetic system" is defined in the text on p. 49 and again in a footnote on p. 157. The glossary of some twelve pages could easily have been left out and needed definitions made parenthetically. "Chromatin" is defined both in the glossary and parenthetically in the text (p. 143). Additionally, many of the glossary entries are more misleading than informative: An "achaene" (sic) is described as dehiscent while no mention of dehiscence is made in the entry for "capsule". "Chiasma" is said to be "an exchange of partners . . .". "Relationship. A statement about two or more objects that is either true or false."

While the general coverage of topics germane to biosystematics is quite good, there are a few conspicuous omissions. There is no discussion of apomixis even though this phenomenon is of major importance in the biosystematics of many genera of flowering plants. Ecotypic variation is very well treated but there is no mention of clinal variation. Finally, perhaps a minor point, there is no mention of the importance of voucher specimens for documenting biosystematic research.

Apart from the points raised above, I feel that the author has realized his objective. No other textbook approximates to such a neat synopsis of current thought and method in today's biosystematics. Solbrig is to be congratulated for recognizing an empty niche and capably filling it. It will be interesting to see whether his text will succeed or be displaced by competitors, which are sure to come.—JOHN L. STROTHER, Herbarium, University of California, Berkeley.

*The Native Cacti of California.* By LYMAN BENSON. xii + 243 pp., illus. Stanford University Press. 1969. \$7.95.

Lyman Benson, leading specialist in the taxonomy of the cacti of the United States and Canada, has produced a well-organized and thoroughly illustrated book on the more than 50 different taxa of this family that occur naturally within California. This compact publication will appeal to a broad range of readers.

A two and one-half page key introduces the nine genera that are covered. Each genus is treated in detail with a description and, where needed, a key to the species and varieties. The individual taxa are described and their distribution within the state is mapped; nearly all are also illustrated, often more than once.

Four color plates by L. C. C. Krieger are superb; the colors, shading, detail, and accuracy may well be the best that have been employed to illustrate cacti. Also

very good are the black and white photographs by David Griffiths and the line drawings by Lucretia B. Hamilton. Some of the color photographs taken in the field are less inspiring but are nearly always helpful for identification. Most of the legends are informative; but a few would have been more useful if the taxonomic significance of the flower parts had been commented on, rather than the names of these parts merely pointed out. In one unfortunate instance there are eight pages of color plates inserted between a photographic figure and its legend.

Some of the distributional information is, of necessity, incomplete. The author has constructed distribution maps primarily on the basis of herbarium specimens examined; however, as cacti are seldom collected by most botanists and only rarely collected in large duplicate sets, the herbarium record often leaves a part of the distribution undocumented. For example, the distribution of *Opuntia prolifera* actually includes four other Southern California off-shore islands in addition to the three indicated. Further, *O. oricola* and *O. littoralis* var. *littoralis* occur on all the islands of this group; and the distribution of *O. phaeacantha* var. *major*, as it is designated in this publication, extends into the southernmost portion of Santa Barbara County rather than merely along its northern fringe as shown. It should also be noted that this latter taxon is the only native flat-jointed *Opuntia* known from San Luis Obispo County. The mapping of *O. l.* var. *littoralis* in this county is in error.

With the anticipated publication of his more technical and comprehensive *Cacti of the United States and Canada*, the present book is, in many ways, intentionally popular. In deference to the layman, the descriptions have been written in non-metric terms; but many readers will find fractions of an inch, such as 1/128, more awkward than decimal equivalents in millimeters.

In addition to the features already mentioned, this book contains the following special sections: a taxonomic summary inside the front and back covers, a long general introduction, a historical section, and a pertinent biographical list. The taxonomic summary serves as a convenient index and outline of general classification and distribution; it is surprising to note that within California nearly as many kinds of cacti occur in the chaparral as in the Mojave Desert. Also of interest is the large number of plant communities in which one can expect to find the beaver-tail cactus, *Opuntia basilaris* var. *basilaris*.

The first 60 or so pages form a relatively elementary introduction that is conspicuously different from the rest of the text. This introductory portion contains general botanical information on structure, identification, classification, nomenclature, distribution, climate, paleobotany, and vegetation types. Such material will be an aid primarily to the beginning student or amateur cactus enthusiast, but everyone will appreciate the characteristically handsome photographs with which these concepts are illustrated.

The historical section was contributed by David L. Walkington and is extremely interesting and pertinent in a plant group where man has played such a significant role in altering recent evolution. This chronological account of cacti in California should, however, have begun with Portola's observation of *Opuntia* along the California coast in 1769, a date which is 24 years earlier than the first event considered here.

The taxonomic portion of the book brings together a number of relatively recent name combinations at the generic, specific, and subspecific level. A few readers, especially those who are familiar with the author's conservative point of view, may be surprised at the recognition of three genera, *Sclerocactus* and *Neolloydia* (segregates of *Echinocactus*) and *Coryphantha* (a segregate of *Mammillaria*).

On the whole, this book is an admirable combination of convenience, attractiveness, and completeness—a book that will be used by cactus enthusiasts, students, and amateur and professional botanists.—RALPH N. PHILBRICK, Santa Barbara Botanic Garden.